Docket Management System,
U.S. Department of Transportation,
Room Plaza 401,
400 Seventh Street, SW,
Washington DC.
20590-0001

DOCKET NUMBER FAA-2002-12461

Dear Sir,

With reference to the proposal by the FAA to amend the regulations and establish flight simulation device qualification requirements for all certificate holders in a new part.

I have read the proposed rules dated September 25th 2002, and have the following comments and suggestions.

I would initially like to express my concern that the complexity and structure of the document may make it impractical to work with, not least the confusing paragraph numbering system, which does not lead itself to simple referencing. Complaining about the numbering may seem pedantic, but the MQTG will be produced to present the test results numbered in accordance with the regulations. Every test condition for which a result is expected in the MQTG must be explicitly identified in the Table of Tests so that a consistent numbering can be applied. The Table of Tests must be a complete index of all test conditions for which results in the MQTG are expected, whether or not they have applicable tolerances. Similarly every feature for which a SOC is expected should have a corresponding requirement against which it can be written.
For example, requirements 3L and 3M on page 60323 stipulate that test results are included in the MQTG to confirm that these requirements are met. However no suitable test has been identified in the "Table of Objective Tests" to satisfy these requirements. Similarly in the "Table of Objective Tests", on page 60344, the Brake Fade feature is listed as being a "Objective Test", for which no tolerance is given, and a SOC is expected, even though the simulation of brake fade is not given as a requirement in the previous section. If the regulations fail to provide this basic foundation it will lead to considerable confusion during the production of the MQTG and subsequent evaluation.

I would like to object to the way that our regulations are becoming so overly prescriptive. There is a growing culture in our industry to add numerous churlish clauses to every test condition, clearly just to spite a one-off incident that the regulators have previously encountered. Doesn't this approach become eventually self defeating? By explicitly stipulating that the flap setting should not be changed during the middle of a power change dynamics test, one implicitly suggests that changing power setting during flap change dynamics is acceptable? More that anything we are starting on a never-ending spiral of clauses, stipulation and exemptions. If the regulations were written to include a description of the 'intent' of each test, then many of these comments could be removed.

Of all the comments that I will raise below I must highlight our concern over the new motion tests. The performance targets specified in this section far exceed the current capability of production motion systems, and of the established helicopter standards, which, in themselves, were agreed by the industry to be very demanding. These figures must be corrected to more achievable values.

The following list of comments are submitted for your edification.

Page 60293 – Modifications to FSD's
The process of re-hosting is covered by Section 60.23 paragraphs c, d & e. There seems to be a contradiction here, one can not seek prior approval, if the application for approval requires results produced after the modification.
May I recommend that the regulations be reworded to remove the requirement of objective test results from the prior notification, and state that they should be forwarded to the NSPM immediately following the modification.

Page 60300 – International Compatibility
Quote : *"The FAA has reviewed the corresponding ICAO Standards and Recommended Practices and has identified no differences with these proposed regulations."*
This statement is untrue, as the regulations and Table of Objective Tests contained within the proposed Part60 are not in agreement with the latest ICAO standards.
Where there are major deviations between the proposed Part60 standards and the latest agreed ICAO standards, the motion requirements being a good example, industry needs to be aware of how the Part60 standards will evolve towards the ICAO standards. It is unreasonable for industry to be expected to expend major investment to meet a standard that may only be in existence for a few months.

Page 60313 – 9 - Simulator Data Requirements
This rule which stipulates the prior submission of the data to the NSPM for approval, does not make allowances for the use of data previously approved by the NSPM by way of the VDR (Validation Data Roadmap).

Page 60320 – Requirements - 2A
TYPO – Final paragraph in notes, change "sets" to "seats".

Page 60322 - Requirements – 3B
This requirement seems pointlessly vague and unnecessary. The explicit statement of this requirement has been made redundant by the current objective tests of model fidelity and latency. Providing a SOC in the QTG to say that computer is good enough, achieves nothing.

Page 60322 - Requirements – 3C
In most situations it will be impossible to comply with the 6 months update period stipulated by this requirement, we would recommend the retention of the original wording " timely update".

Page 60322 – Requirements – 3G & 3H
Both of these requirements are referring to the same automatic test system, there does not appear to be a clear distinction between the intent of the two paragraphs and so we recommend that they are merged into a single requirement. I believe that the original intent of the two requirements was to provide a system that facilitate manual testing on early devices, and that the second requirement was for a full-blown automatic test system as one expects on a modern level D device. If this is still the case then these paragraphs should be re-written to reflect this.

Page 60322 - Requirements – 3I
The new requirement to supply a traditional latency test in addition to throughput latency is unacceptable, suitable comparison data does not exist for many types and for CCA flight test data would be impractical as it could be effected by changes to the electronic flight control system revision. The original justification for throughput latency used when it was introduced is still valid, the remainder of the QTG includes adequate examples of aircraft response. We should recall that the whole reason for moving to throughput latency was that earlier method proved to be unworkable in practical terms.

Page 60322 - Requirements - 3J
This requirement now reads that for C & D simulators it is necessary to provide QTG test results for stopping time & distance on Patchy Wet, Patchy Ice and Wet Rubber in TDZ conditions. These runway conditions were added to the simulator programming to provide demonstration of a handling issue, not a performance one. It is totally inappropriate to attempt to measure the change in stopping time and distance for these conditions, particularly as they are usually programmed with a high degree of randomization.
As far as simulator **requirements** are concerned, all of the runway surface contaminations are required, Dry, Wet, Icy, Patch Ice and Patch Wet, and Wet on Rubber Residue in TDZ, however it is only necessary to provide validation of the first three of these. To this end we suggest a return to the original wording in AC120-40C.

Page 60323 - Requirements – 3M
The icing requirement has been moved to, and adequately covered by, the new requirement 3L. The wording regarding icing (subparagraph 3) should therefore be removed from this paragraph.

Page 60323 - Requirements – 3N
This new requirement is rather vague, and we would appreciate a better description of the reason and intent of this requirement. As it stands, it provides insufficient information on how to comply with this requirement.

Page 60324 – Requirements – 5C
Why is it thought necessary to single out the control of wind speed and direction as an explicit requirement, can we therefore conclude that the control of QNH is not required for a Level D simulation?
If instructors station controls are to be explicitly identified in this manner then the list should be comprehensive, I would however consider that the following change to the wording of paragraph 5b, and deletion of this requirement would be more sensible:-
"… to control all required environmental and system variables and …"

Page 60324 – Requirements – 6E
All of these buffet conditions are "as applicable", not just items 7,8 & 9.
I have always found the clause on stall buffet below Vs confusing, as it seems inappropriate as a requirement the simulator programming. The clause explicitly permits the situation where stall buffet suddenly disappears at 1kt below certificated stall speed, which might lead a trainee pilot to conclude that he had recovered from the stall. The limitations of flight test data collection are not applicable in this instance, as the assessment is to be qualitative, therefore it seems illogical to permit anything other than representative simulator response.
Although I understand that training would not be conducted below Vs, it seems only appropriate that simulator performance should be representative at ether side of such an easily transgressed limitation.
Surely this clause belongs in the section which describes the testing, and test data required to validate stall buffet, and not the simulator programming requirements.

Page 60326 – Requirements – 7I
I do not understand what the 'regardless of previous qualification standards' clause is supposed to mean, equally does 'for all approaches' mean that VGS data is required for every approach the simulator visual database? I think that this sentence should be re-written to more clearly state the regulators intent.
TYPO - The sub-paragraphs appearing in the 'Additional Details Column', should be moved back into the first ' General Simulator Requirements Column'.

Page 60327 – Requirements – 7O
TYPO – In Additional Details, the word height is unnecessary, as altitude has been previously used in the same sentence.

Page 60330 – Requirements – 8C
The wording of the ‘Additional comments’ now implies that objective testing of precipitation and windshield wiper sounds is required and should be compared to data. In AC120-40C a clause existed which limited testing to those noises which originated from the aeroplane and aeroplane systems. This clause should be reinstated, or the reference to precipitation removed, as it is already adequately covered in requirement 8.b

Page 60330 – Requirements – MISSING ITEM
The requirement 2U in AC120-40C does not appear in Part 60. The majority of the content of 2U is adequately covered elsewhere, however we have been unable to locate an equivalent to subparagraph 1, which permits the recording of control dynamics on irreversible control systems by applying the correct pitot pressure to the system. This is an important concession that must be retained.

Page 60330 - General Comments -Paragraph 7
The use of the term ‘Integrated testing', as later defined on page 60357, precludes the use of an automated testing system, such as those typically used on modern simulator. An automated system will need to bypass or modify some of the computer models in order to inject demands and stimuli during the test. This essential functionality should be recognized within the wording of the definition on page 60357.

Page 60330 - General Comments -Paragraph 8
{Requirement for 5sec before and 2 sec after snapshot]. Sponsor may not have access to the FT data to establish this, also such a period is not necessary, or possible, to achieve for some flight conditions.
Eg: Longitudinal manoeuvring stability flight test data is gathered during a progressively steepening and descending turn, for many aircraft this will need new data to be collected if 7 seconds of stabilized conditions at each bank angle are required.

Page 60331 – General Comments – Paragraph 12
This paragraph really needs re-writing to improve readability, and prevent contradictions. My suggestion is as follows:-

(12) For testing Computer Controlled Airplane (CCA) simulators, or other highly augmented airplane simulators, flight test data are required for either, or both, the Normal (N) and Non-normal (NN) control states, as indicated in this attachment. ~~except that some tests require data only in the Normal control state and are so noted.~~ All tests in the Table of Objective Tests require test results in the Normal control state unless specifically noted otherwise in the additional requirements section following the CCA designation. Where Non-normal control states are required, test data must be provided for one or more Non-normal control states, and must include the least augmented state. Where test results are independent of control state, either Normal or Non-normal control data may be used. Tests for other levels of control state degradation may be required as detailed by the NSPM at the time of definition of a set of specific airplane tests for simulator data. Where applicable, flight test data must record Normal and Non-normal states for:

Page 60331 – Table of Objective Test
TYPO – Start numbering at “1”, rather than “2”.

Page 60333 – Table – 2B8
Use of just % Body Rates is always problematic, when rates are very low, tolerance approaches zero.
Although I understand that the FAA isn’t going to start off being compliant with the latest ICAO standard these basic faults should be rectified.

Page 60336 – Table 3
The prologue that begins this section, written in the first 34 lines of the Test column, would be better placed in Section 5 on page 60346. Section 5 should then be renamed to reflect that it contains general control testing information, and not just control dynamics information.

Page 60338 – Table – 3B4
Use of just % Body Rates is always problematic, when rates are very low, tolerance approaches zero.
Although I understand that the FAA isn’t going to start off being compliant with the latest ICAO standard these basic faults should be rectified

Page 60341 – Table – 3C3
The explicit and overly prescriptive instructions of how to fly a roll damping manoeuvre (I use the original name for this test, as it more adequately defines the intent), will preclude the use of some existing data, and possibly the amalgamation of this test condition with 3c2.
A description to the test pilot, on how to fly the manoeuvre for the purpose of gathering data for simulation, does not belong in here, it should be placed in the IATA Data Document ISBN 92-9035-891-2.

Page 60342 – Table – 3E2
TYPO – In the tolerance section, final line should read “or +/-5lbs (+/- 2.2 daN)”.

Page 60343 – Table – 3E6
This condition actually calls for three separate tests to be provided, which could be increased to six test cases for CCA.
3e6(a) Go-Around
3e6(b) Go-Around (One Engine Inoperative)
3e6(c) Go-Around (Autopilot Engaged)
As written it does not clearly define which needs to be repeated in Non-Normal mode for CCA, and it is felt that these three test conditions would be more clearly specified if they were written as separate conditions rather than as mere comments in the Additional Details column.

Page 60344 – Table – 3 (Motion System)
The performance of the motion system specified in this section substantially exceeds the capability of motion systems currently in production, the values appear to be twice those quoted for the (mostly achievable) helicopter motion system on page 60456.
These specifications could not be met with current hardware, and indeed it might not prove possible to operate such a device within the confines of a typical simulator bay.
Furthermore this section is quite clearly a table of ‘requirements’ and not ‘tests’, particularly as many of these items can be satisfied by a SOC. This whole section should be moved into the requirements section, and only those issues which require the inclusion of test results in the MQTG, (eg: 3d Phase Lag) should be listed here.

Page 60346 – Table – MISSING ITEMS
The motion hardware tests, Crosstalk, Leg Balance and Smoothness have been deleted, together with their respective tolerances. Although they have been included as Functional and Subjective test, this will not provide the regulators with visibility of hardware degradation during recurrent evaluations that was previously apparent.

Page 60346 – Table – MISSING ITEMS
The level D vibration tests are not included in the table of objective test, these must be included to provide a consistent numbering scheme for the MQTG.

Page 60346 – Table – MISSING ITEMS
The level D sound tests are not included in the table of objective test, these must be included to provide a consistent numbering scheme for the MQTG.

Page 60346 – Table – MISSING ITEMS
The level D visual tests (including latency) are not included in the table of objective test, these must be included to provide a consistent numbering scheme for the MQTG.

I hope that our observations are helpful,

Yours respectfully,

Ian Bateman & Gerry Elloy